

*A Finely Crafted O'Brien Unit 8 Test*

**Calculator Section:** You may use a calculator (or the calculator on your laptop- **no internet or notes**). Use a pencil. Show all work and circle your answer. Use your time wisely; you will be able to earn additional credit after the timed portion of the test by completing Supercorrections. When you finish, put away your calculator and you can come up to get the non-calculator part—you may continue to work on both sections without your calculator.

1. Patrick needs to simplify  $(2x^4)^3$ . He gets  $6x^{12}$  as the answer.

- a. Replace the  $x$  in  $(2x^4)^3$  with the number 1.7 and use your calculator to simplify.
- b. Replace the  $x$  in  $6x^{12}$  with the number 1.7 and use your calculator to simplify.
- c. How do your answers in parts a. and b. show you that Patrick's answer is **incorrect**? Can you use this method to check other simplification answers on this test?
- d. Simplify  $(2x^4)^3$  correctly (be sure to check your answer by replacing  $x$  with 1.7!).

2. Simplify.

a.  $b^3 \cdot b^4$

b.  $(b^2)^4$

c.  $\frac{b^6}{b^2}$

d.  $b^0$

3. Evaluate. Express your answer **in scientific notation**.

a.  $(5.8 \times 10^7) + (7.2 \times 10^7)$

b.  $\frac{7.2 \times 10^8}{6 \times 10^2}$

4. Determine whether each statement is true or false.

a.  $25x^2 = (5x)^2$

b. In the expression  $-12x^3$ ,  $-12$  is the base.

c.  $(x^2)^4 = (x^4)^2$

d.  $x^{-3} = -x^3$

5. Circle the **best answer** for the following multiple-choice problems.

a.  $(3x^0)^2 =$

**A** 9

**B**  $9x^2$

**C** 1

**D** 6

b.  $5x^{-2} =$

**A**  $\frac{1}{25x^2}$

**B**  $\frac{1}{5x^2}$

**C**  $\frac{5}{x^2}$

**D**  $\frac{25}{x^2}$

6. Go to the class website and order the 8 numbers in scientific notation using the sorting bins. After you have done this correctly, do it again **without** the sorting bins, but **do not** click check. Call, Mr. O'Brien over, and he will write down the number that you get correct. **No calculator on this question!**

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7. Briefly explain why the following statements are **incorrect**.

a.  $(12x^5) \div (3x^5)$  is the same as  $4x$

b.  $3n^{-4}$  is the same as  $\frac{1}{3n^4}$

8. Simplify each fraction so there are no negative exponents.

a.  $\frac{y^3}{y^{-5}}$

b.  $\frac{45t^6}{5t^2}$

c.  $\frac{18x^3y^3}{12x^6y^2}$

d.  $\frac{a^2b^{-3}}{c^{-5}}$

9.

- a. The national debt of the United States as of April 28, 2010 is \$12,888,000,000,000. Write this number **in scientific notation**.
- b. A nanometre is 0.000000001 metres. Write this number **in scientific notation**.
- c. The nearest star to Earth is Proxima Centauri. It is approximately  $3.99 \times 10^{13}$  km away. Write this number **without using scientific notation using commas**.
- d. The diameter of a red blood cell is  $6.5 \times 10^{-3}$  cm. Write this number **without using scientific notation**.

10. It is easy to get confused when simplifying algebraic expressions like  $a \times a \times a \times a$  and  $a + a + a + a$ .

- a. What does  $a \times a \times a \times a$  equal?
- b. What does  $a + a + a + a$  equal?

11. **Simplify** the following completely (write answers **without** negative exponents).

a.  $(-2r^3)^2$

b.  $-2a^7b^4 \times 7a^5b^3$

c.  $(5p^{-2})(-m^7p^7)$

d.  $(w^3x^{27}y^9)^0$

12. Often, an exponent problem can be written in expanded form and then simplified without using exponent laws. This is a good way to check an answer. Take, for example,  $(3xy^2)^3 \cdot (-xy)^2$ . Expanding with the outside exponents of 3 and 2 first, it can be written as  $(3xy^2) \cdot (3xy^2) \cdot (3xy^2) \cdot (-xy) \cdot (-xy)$ . Expanding each parenthesis, it can be written as  $3 \cdot x \cdot y \cdot y \cdot 3 \cdot x \cdot y \cdot y \cdot 3 \cdot x \cdot y \cdot y \cdot -1 \cdot x \cdot y \cdot -1 \cdot x \cdot y$ . Finally, it can be simplified by multiplying numbers first followed by letters to obtain  $27x^5y^8$ .

Use this method to simplify  $(-2m^2n)^3 \cdot (3mn)^2$ :

- Expand with the outside exponents of 3 and 2 first.
- Expand each parenthesis.
- Simplify your answer by multiplying numbers first followed by letters.

13. **Simplify** the following completely (write answers **without** negative exponents).

a.  $(2x)^2 \cdot 2x^4$

b.  $\frac{x^6}{x^{12}}$

c.  $3^{-2}$

14. Find the missing value that makes each statement true.

a.  $4y^2 \times [??] = 8y^6$

b.  $\left(\frac{z^3}{y^4}\right)^{[??]} = \frac{y^{12}}{z^9}$

15. Thatquiz.org Question #1.

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16. Thatquiz.org Question #2.

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*Go back and check your answers- the fewer Supercorrections, the better!*